ABSTRACT

THESIS: The Effects of Cleat Placement on Muscle Mechanics and Metabolic Efficiency in Prolonged Sub-Maximal Cycling

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This study quantified the changes in pedaling mechanics and energy expenditure accompanying a posterior shift in cleat placement during prolonged cycling. Six male competitive cyclists participated. Each subject was asked to complete two separate hour long rides using traditional cleat placement and a novel heel placement, respectively. Expired gasses, kinematics, and EMG from 7 lower limb muscles were collected at three time intervals during each ride. No significant difference in O_2 utilization was seen ($p=0.905$). A significant difference was seen in sagittal plane knee angle ($p=0.008$) and angular velocity ($p=0.003$) in the heel condition, demonstrating a more extended knee and lower peaks in angular velocity. Musculo-tendon kinematic data showed no differences. Tibialis anterior (TA) iEMG was higher in the heel condition, and SOL and TA showed differences in timing between conditions. These results demonstrate changes in ankling patterns and knee joint kinematics as adaptations to heel pedaling.